Chapter One: Introduction

Washington State is incrementally upgrading Amtrak *Cascades* passenger rail service along the Pacific Northwest Rail Corridor (PNWRC) in western Washington (see **Exhibit 1-1**). The state's goal is to provide safe, faster, more frequent, and reliable passenger rail service.

The state's vision for intercity passenger rail in the Pacific Northwest extends over a twenty-year horizon. The vision is being implemented through a step-by-step approach. Service is being increased over time based on legislative funding and market demand.

Exhibit 1-1
Pacific Northwest Rail Corridor

What is intercity passenger rail?

Intercity passenger rail connects a central city to a central city on a railroad right of way. Those rail corridors which are less than five hundred miles in length are considered to be the most viable places for intercity passenger rail service because these corridors lend themselves to efficient and economical service.

Passengers aboard Amtrak *Cascades*, the Pacific Northwest's intercity passenger rail service, travel an average of 140 miles and typically travel to business meetings, to visit family and friends, to shop, and to attend special events. Longer distance intercity passenger rail trains in the Pacific Northwest include Amtrak's *Coast Starlight* and Seattle/Portland-Chicago *Empire Builder*.

Sound Transit's *Sounder* commuter rail service, which shares the BNSF Railway Company's (BNSF) right of way with Amtrak *Cascades* service, is an example of commuter rail.[1] Intercity passenger rail differs from commuter rail in a number of ways. Although both forms of rail service typically travel along existing railroad rights of way, commuter rail connects a central city with its suburbs. In addition, commuter rail provides service during morning and evening commute hours.

Other modes of passenger rail travel include high speed rail, heavy rail and light rail. High speed rail, like Japan's bullet train, is a faster version of Amtrak *Cascades* rail service. High speed rail travels at speeds greater than 110 miles per hour (mph) and typically uses its own dedicated right of way.

Heavy and light rail transit is found in dense urban areas. Both modes of transit serve urban residents for commuting as well as leisure travel. Heavy rail lines travel on their own dedicated rights of way and are grade-separated—either above or below ground. New York City's subway and elevated system is an example of heavy rail. Light rail, on the other hand, often shares its right of way with automobiles. An example of light rail is Portland's MAX system and Sound Transit's future LINK light rail system.

Where do the trains run?

Amtrak operates Amtrak *Cascades* service in the state of Washington over the BNSF's north-south main line.[2] The alignment roughly parallels Interstate 5 and runs through nine counties in western Washington: Clark, Cowlitz, Lewis, Thurston, Pierce, King, Snohomish, Skagit, and Whatcom. These trains also travel through parts of Oregon and British Columbia. This plan focuses on the rail corridor that connects Portland, OR, Seattle, Vancouver, BC, and ten intermediate communities.

Why does intercity passenger rail service in this corridor make sense?

The viability of corridor rail service is driven by several key factors. Based on research recently conducted by the American Association of State Highway and Transportation Officials (AASHTO), approximately eighty-one percent of all intercity trips greater than one hundred miles do not extend

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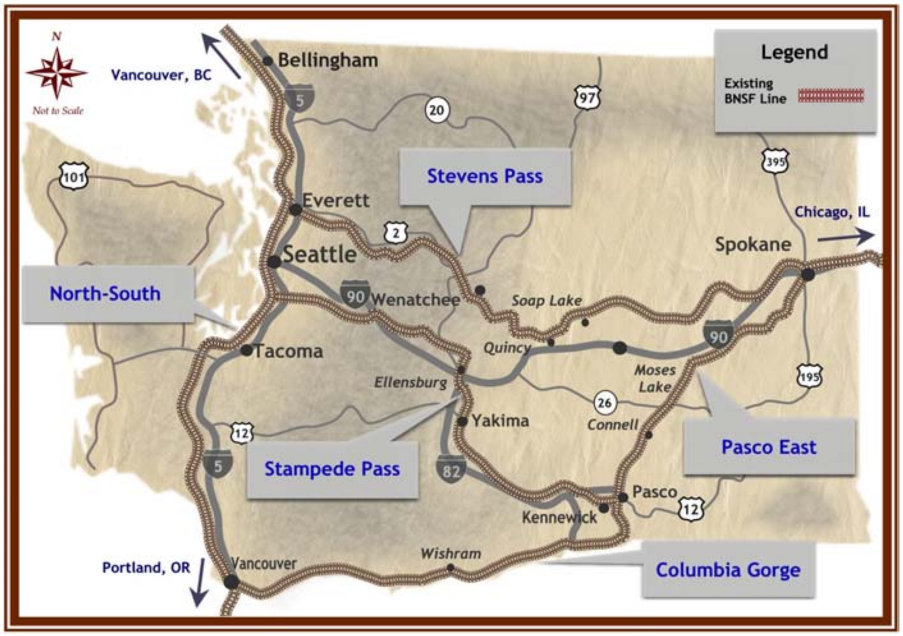
[1] *Sound Transit, the regional transit provider in the Puget Sound area, is developing commuter rail service (Sounder) between Everett and Lakewood. This service shares rail right of way with Amtrak Cascades service.*

[2] *BNSF has four main line routes in Washington State, as illustrated in* ***Exhibit 1-2.***

Exhibit 1-2
BNSF Railway Company's
Main Line Routes in Washington State



beyond five hundred miles.[3] Corridor rail service of five hundred miles or less, with frequent daily departures and travel times of several hours or less between major population centers, can eliminate the need to travel on congested highways, as well as to and from airports located in suburban areas. Corridor rail service can also provide transportation to communities not served by regional air carriers, help relieve aircraft congestion at major airports, and can become an attractive mode of transport for business travelers and those taking single day round trips.

When did planning for passenger rail service begin?

Planning for intercity passenger rail along the PNWRC began in the late 1980s with the inception of the Rail Development Commission. This Commission's work eventually led to a number of analyses, projects, and the creation of the Washington State Department of Transportation (WSDOT) Rail Office.

[3] *Intercity Passenger Rail Transportation, American Association of State Highway and Transportation Officials, Standing Committee on Rail Transportation, 2002. Page 4.*

What specific activities led to the development of Amtrak *Cascades* service?

In 1991, the state legislature[4] directed WSDOT to develop a comprehensive assessment of the feasibility of developing a high speed ground transportation system in Washington State as part of a long-term solution to congestion on the state's major transportation corridors. Following this directive, in early 1992, the WSDOT Rail Office applied to the U.S. Department of Transportation (USDOT) for federal high speed corridor designation.[5] The application was accepted, and the PNWRC became one of the five federally-designated federal corridors in the United States.[6]

During the same period, several studies were conducted resulting in the *Statewide Rail Passenger Program - Technical Report* (January 1992), the *High Speed Ground Transportation Study* (October 1992), *and the Washington Statewide Rail Passenger Program (Gap Study)* (June, September, and December 1992). These studies included analysis of possible rail corridors statewide for items such as: ridership demand, funding sources, train speeds, and number/frequency of trains (level of service). These analyses also focused on identifying the appropriate technology and route for intercity passenger rail in Washington State. The range of technology reviewed included improved conventional rail, tilt body trains, electrification, and magnetically elevated trains (maglev). [7]

In addition, both the *High Speed Ground Transportation Study* and the *Gap Study* clearly demonstrated that development of a new rail corridor—especially in western Washington—would be very expensive. Discussions with community members and local legislators suggested that a new rail corridor would not be welcomed due to the potential impacts to the environment and surrounding communities.

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[4]*Substitute House Bill (SHB) 1452.*

[5]*The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) became law in December 1991. Section 1010 of this Act called for selection of not more than five corridors to be designated as high speed rail corridors.*

[6]*The other four original federally-designated high speed rail corridors are: the Midwest corridor linking Detroit, MI with Chicago, IL, St. Louis MO and Milwaukee WI; the Florida corridor linking Miami with Orlando and Tampa; the California corridor linking San Diego and Los Angeles with the Bay Area and Sacramento via the San Joaquin Valley; and the Southeast corridor connecting Charlotte, NC, Richmond, VA, and Washington, DC.*

[7]*Conventional and tilt-body trains are powered by diesel locomotives. Tilt body trains can run at higher speeds than conventional trains on existing tracks. The tilt system has air springs in the main suspension that allows the train to tilt naturally when traveling on curves. The train tilts towards the curve without stressing the passenger. Electrifying rail tracks to power trains is a technology which has been used extensively on the East Coast. Maglev is a type of rail technology which uses magnetic forces to power the rail vehicles.*

Exhibit 1-3
Cost Comparison of High Speed Ground Transportation

Technology	Type of Corridor	Estimated Cost*
Tilt and Conventional Trains	Existing Rail Right of Way	$10 million / mile
Electrification	Existing Rail Right of Way	$20 million / mile
Maglev	New Corridor	$30 million / mile

**In 1993 dollars*
Source: High-Speed Ground Transportation: Issues Affecting Development in the United States, U.S. Government Accounting Office, November 1993.

Another option identified in these reports was electrification of the existing rail line. This option was also dismissed due to cost and its potential impacts to rail operations on the BNSF main line. A 1993 study by the U.S. General Accounting Office (GAO)[8] confirmed the high costs, and infeasibility, of these other options. **Exhibit 1-3** compares the results of the U.S. Government's research.

WSDOT's and GAO's findings were re-enforced in 1997, when the Federal Railroad Administration (FRA) released its Commercial Feasibility report.[9] This report found that the costs differential associated with constructing high speed rail were higher than previously identified. **Exhibit 1-4** illustrates this comparison.

Exhibit 1-4
Revised Cost Comparison Associated with
High-Speed Ground Transportation

Technology	Type of Corridor	Estimated Cost*
Tilt and Conventional Trains (90 to 110 mph)	Existing Rail Right-of-Way	$1 to $5 million/mile
Tilt and Conventional Trains (up to 125 mph)	Existing Rail Right-of-Way	$3 to $7.5 million/mile
Tilt and Conventional Trains	New Corridor	$10 to $45 million/mile
Maglev	New Corridor	$20 to $50 million/mile

**In 1997 dollars*
Source: High-Speed Ground Transportation for America, USDOT Federal Railroad Administration, September 1997.

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[8] *High-Speed Ground Transportation: Issues Affecting Development in the United States, U.S. General Accounting Office, November 1993, page 13.*

[9] *High-Speed Ground Transportation for America, USDOT, Federal Railroad Administration, September 1997.*

What type of high speed rail was chosen for the PNWRC?

Specific findings of the *High Speed Ground Transportation Study Final Report* (October 1992) resulted in a decision to pursue a combination of improved conventional rail and tilt body trains. The *Gap Study* took these findings and examined combinations of service frequency and travel time against ridership, cost, and revenue. Two scenarios were examined in detail:

Scenario One:

- Four daily round trips between Seattle and Vancouver, BC (four-hour headway[10]; three hours travel time).
- Nine daily round trips between Seattle and Portland, OR (headway in multiples of one hour; two hours and thirty minutes travel time).

Scenario Two:

- Eight daily round trips between Seattle and Vancouver, BC (two-hour headway; two hours and thirty minutes travel time).
- Seventeen daily round trips between Seattle and Portland, OR (one-hour headway; two hours and fifteen minutes travel time).

This information resulted in a decision to pursue an operating plan between the two scenarios studied:

- Four daily round trips between Seattle and Vancouver, BC (four-hour headway; travel time two hours fifty-seven minutes); and
- Thirteen round trips between Seattle and Portland, OR (headway in multiples of one hour; travel time two hours thirty minutes).

Research indicated that this scenario provided the best mix of ridership, revenue and costs.

This approach was adopted by the Washington Transportation Commission, and was forwarded to the legislature for review. Based on the Commission's recommendation, the 1993 Legislature passed Engrossed House Bill (EHB) 1617 that was codified in RCW 47.79. This legislation established the high speed ground transportation program and set goals for top speeds. The legislation mandated that "high-quality intercity passenger rail service shall be developed through incremental upgrading of the existing service."

[10] *A headway is a transit term which refers to the amount of time between trains leaving a particular station or location.*

Did this legislation result in further analysis?

Further studies were conducted resulting in the *Washington Rail Capacity Analysis* (October 1994) and *Options for Passenger Rail in the Pacific Northwest Rail Corridor* (1995). The rail operations modeling for these studies included information about the characteristics of the existing rail network such as: grades, curve radii and banking, track and switch classifications, allowable speeds, performance characteristics of the various locomotives and trains using the system, and the schedules for all trains using the corridor. From this, a detailed database was created that could be used to calculate train operations and movements including schedules, meets (conflicts) with other trains, bottleneck locations, and delays due to lack of track capacity and other factors. Future projected freight and passenger traffic levels, desired running speeds and times between locations, desired schedules, and equipment characteristics were run through the model. Through an iterative (back and forth) process, the model identified a particular set of improvements that would safely provide the optimal service for passenger and freight rail.

During this period (1994 and 1995), extensive analysis of maximum speeds along the corridor was performed. Although initial findings indicated that speeds in excess of 125 miles per hour (mph) were required to achieve the desired travel times, further analysis indicated that this was not the case.[11] The study team reviewed speeds of 110 to 125 mph, and found that only in some cases would trains be able to travel at the higher speeds, thus resulting in only a two minute travel time savings between Seattle and Portland, OR. In addition, the cost between constructing 110 mph service and 125 mph service was over $500 million (in 1995 dollars). As such, the Amtrak *Cascades* service, as presented in the long-range plan, travels at maximum speeds of 110 mph.

When was the first long-range plan released?

Throughout the late-1990s, WSDOT prepared and released the *Pacific Northwest Rail Corridor Intercity Passenger Rail Plan for Washington State, 1997-2020* (December 1997; revised December 1998, updated April 2000). In addition, a programmatic, corridor-wide environmental analysis[12] was produced in 1998 to ensure that corridor operations would not adversely affect communities and the environment along the BNSF main line.

[11] *Due to constraints such as right of way, vehicle performance, and the mix of trains on the corridor.*
[12] *See Amtrak Cascades Environmental Overview Technical Report, 1998, reprinted 2005.*

How is this plan different from previous plans?

This revised long-range plan summarizes recent work performed by the WSDOT Rail Office. This recent work updates previous studies and includes revisions to capital costs, operating costs, ridership and revenue projections, operating and infrastructure plans, and cross-modal comparisons.

Has WSDOT coordinated with other agencies while developing this plan?

Beginning with the first planning study for intercity passenger rail service along the PNWRC, WSDOT has been working closely with Amtrak, BNSF, the state of Oregon, the province of British Columbia, local and regional agencies, ports, and Sound Transit.

How has Sound Transit's *Sounder* commuter rail program been integrated into this planning effort?

Infrastructure and operation planning for *Sounder* was integrated with Amtrak *Cascades* planning, beginning in the early 1990s. This early coordination and planning ensured the most economical use of infrastructure. It also ensured the absence of conflict between the two passenger rail services.

Development of the *Sounder* program has continued independently of PNWRC development since 1996. However, the infrastructure plan remains similar to the original integrated plan, and WSDOT's operation planning continues to integrate the *Sounder* and Amtrak *Cascades* services.

Were other local transit agencies included in this planning effort?

Throughout the corridor, WSDOT has worked with local transit agencies to ensure that public transit service and Amtrak *Cascades* service provide a unified, seamless transportation system. Local transit agencies have worked to modify their bus transit schedules to meet arriving Amtrak *Cascades* trains at local stations.

What is WSDOT's relationship with the state of Oregon and the province of British Columbia?

The Pacific Northwest Rail Corridor was developed based on three corridor segments between:

- Eugene and Portland, OR;
- Portland, OR and Seattle; and
- Seattle and Vancouver, BC.

The state of Oregon participated in the early planning work for the corridor, concentrating on the Eugene to Portland, OR segment. Although it begins in Oregon, the Portland, OR to Vancouver, WA segment is associated with the Portland, OR to Seattle segment. As such, most of the planning work for this segment has been conducted by WSDOT.

Approximately one-fourth of the Seattle to Vancouver, BC segment is located in British Columbia. The province of British Columbia participated in some of the planning work before 1995, but most of the program development has been conducted by WSDOT. However, a renewed interest in rail service has emerged in British Columbia since the announcement that the 2010 Winter Olympics will be held in the Vancouver, BC region.

WSDOT has taken on the responsibility of planning passenger rail service in parts of Oregon and British Columbia because both fall within a service segment which lies predominately in Washington. The lack of detailed plans for the segments outside of Washington could result in the inability to continue Amtrak *Cascades* program development in Washington.

Does this long-range plan consider Amtrak *Cascades* service between Portland and Eugene, OR?

Passenger rail service between Eugene and Portland, OR will be considered separately. Planning for this segment was not integrated with this infrastructure plan. As of this writing, the future of the Oregon portion of the program is unclear. Assuming that some service will be operated, service may be extensions of any of the Portland, OR to Seattle service, with Oregon supplying additional train equipment as needed.

Have any parts of this plan been implemented?

Over the past ten years, the states of Washington and Oregon have commissioned a series of feasibility studies to assess the practical problems, costs, and benefits of providing public investment to upgrade the corridor for safe, faster, more frequent, and reliable passenger rail service. These efforts have resulted in expanded service between Portland, OR and Seattle (1994 and 1998); reinstated service between Seattle and Vancouver, BC (1995); expanded service between Portland and Eugene, OR (1994 and 2000); and additional service between Bellingham and Seattle (1999). New Amtrak *Cascades* service was introduced in January 1999.[13] This new service features new passive-tilt trains[14] and upgraded customer amenities.

Station improvements throughout the corridor have also been completed (Bellingham; Everett; Olympia/Lacey; Centralia; Kelso/Longview; Vancouver, WA) or initiated (Mount Vernon and Seattle).

To date, nearly $800 million has been invested by the states of Washington and Oregon, Amtrak, Sound Transit, and the BNSF to support Amtrak *Cascades* service between Portland, OR, Seattle, and Vancouver, BC. **Exhibit 1-5** on the following page lists the investments that have been made by the various funding entities between 1994 and 2005.

In addition to these capital expenditures, Amtrak and the state of Washington have provided over $200 million in operating subsidies since the program's inception in 1993.

What information is contained in this plan?

This plan presents information to help communities, agencies and residents understand the state's Amtrak *Cascades* service.

This plan also highlights efforts that have recently been completed and projects that are underway. In addition, a discussion of future improvements to achieve safe, faster, more frequent, and reliable passenger rail service in the Pacific Northwest Rail Corridor is presented. This document also discusses the potential impacts the rail program and its proposed improvements may have on surrounding communities and the natural environment.
In addition to this long-range plan, six technical volumes are available for review. These technical volumes include the detailed analyses, engineering, and projections which were used to develop this long-range plan.

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[13] *Washington State-sponsored intercity passenger rail service began in April 1994. The brand name for this service – Amtrak Cascades – was introduced when the new trainsets began operating in January 1999.*

[14] *Built by Talgo, Inc.*

Exhibit 1-5
Amtrak *Cascades* Investment History: 1994- 2005

Capital Investments
Portland, OR-Seattle-Bellingham-Vancouver, BC

Funding Source	Amount
BNSF Railway Company	$9.4 million
Washington State (WSDOT and Washington State Transportation Improvement Board)	$120 million
Amtrak	$62.0 million
Federal Funds for stations and safety projects (non-Amtrak, Federal Transit Administration and the Federal Railroad Administration)	$44 million
Sound Transit and the Federal Transit Administration (projects improve rail system capacity that benefit commuter, intercity passenger and freight services)	$346.0 million
Oregon (Union Station to the Columbia River)	$13.7 million
Local/other for stations	$13.6 million
Total Capital Investment	$608.7 million

Amtrak *Cascades* Operating Investments
Portland, OR-Seattle-Bellingham-Vancouver, BC

Funding Source	Amount
State of Washington	$150.0 million
Amtrak	$77.0 million
Total Operating Funds	$227.0 million

Total Capital and Operating Investments for Amtrak *Cascades*
Portland, OR-Seattle-Bellingham-Vancouver, BC

TOTAL	**$836.0 million**
WASHINGTON STATE SHARE OF TOTAL	**$270.0 million**

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